

REMARKS

Claims 1-36 are pending in the application.

Claims 1-3 and 19 have been amended to more particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. Specifically, Claims 1-3 and 19 have been amended to define component A as a compound selected from the group consisting of a trialkylphenyl phosphate, triphenyl thiophosphate, tricresyl thiophosphate, and amine salts thereof. Support for this amendment may be found in original Claims 15 and 30 and in the specification at page 6, line 11. Also, Claims 1-3 and 19 have been amended to define component B as a dialkyl phosphate or a trialkyl phosphate or an amine salt thereof. Support for this amendment may be found in original Claims 16 and 31 for the dialkyl phosphate or trialkyl phosphate and in the specification at page 6, line 25 to page 8, line 12 for the amine salt.

Claims 14-16 and 29-31 have been cancelled. Claims 1-13, 17-28 and 32-36 are remaining.

THE PRESENT INVENTION

The present invention as amended relates to a lubricating oil composition for use in industrial oils such as hydraulic oils, bearing oils, industrial gear oils and sliding surface lubricating oils. The lubricating oil composition of the present invention provides excellent thermal stability, extreme pressure resistance and anti-wear performance.

In its broadest aspect, the present invention relates to a lubricating oil composition comprising a major amount of a base oil of lubricating viscosity and

- A. 0.1 to 5.0 wt % of at least one compound selected from the group consisting of a trialkylphenyl phosphate, triphenyl thiophosphate, tricresyl thiophosphate, and amine salts thereof;
- B. 0.01 to 1.0 wt % of a dialkyl phosphite or a trialkyl phosphite or an amine salt thereof; and

- C. 0.01 to 2.0 wt % of at least one compound selected from the group consisting of an alkenyl succinimide, an alkenyl succinic acid ester, benzylamine, and derivatives thereof.

The excellent thermal stability, in addition to acceptable extreme pressure resistance and anti-wear performance, of the present invention is experimentally demonstrated in Tables I and II (on pages 15-16 of the specification). More specifically, comparison between Examples 1-3 embodying the present invention and Comparative Examples C & D (which show the same Shell Four-Ball Test results) indicates that the present invention provides a relatively small amount of sludge and a low viscosity increase in the thermal stability test.

THE REJECTION UNDER 35 U.S.C. 103(a)

Claims 1-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okada et al (4,634,543).

The Examiner states that:

Okada et al ["Okada"] disclose a hydraulic fluid composition for use in a hydraulic shock absorber which comprises (a) a lubricating base oil, (b) 10 to 1,000 ppm, as calculated as boron, of a boron-containing compound, and (c) 100 to 3,000 ppm, as calculated as phosphorus, of phosphoric acid ester and/or phosphorous acid ester. See column 1, lines 10-60. The lubricating base oils include petroleum and synthetic lubricating oils having a viscosity at 40°C of from 5 to 50 cSt. The boron-containing compounds include borated dispersants such as succinimides. See column 1, line 63 to column 3, line 32. The phosphoric acid esters are set forth in column 3, lines 37-54, and the phosphorous acid esters are set forth in column 3, lines 56-62. In addition, Okada teaches that the reaction products of phosphoric acid esters and/or phosphorous acid esters and amine compounds can be used. See column 3, lines 65-67. The examiner is of the position that the hydraulic fluid composition of Okada meets the limitations of the above rejected claims when alkenyl succinimide component (c) is borated which is taught by applicants on page 9 of the specification that a preferred derivative of alkenyl succinimide is a borated derivative. The examiner is of the position that the closest prior art example in Okada is Example 4 set forth in Table 1. Example 4 is an oil composition containing 93.8 % by weight of a petroleum lubricating base oil having a viscosity of 15 cSt at 40°C, 0.5 % of boron-containing compound A, 0.5% of boron-containing compound B, 0.5% of a phosphorous acid ester and 0.5% of a phosphoric acid ester, and other additives

including a lubricating agent, a viscosity index agent and an antioxidant. The composition has a phosphorus content of 685 ppm. Applicants' open-ended claim language "comprising" allows for the addition of other additives to the composition."

Applicants respectfully must traverse the Examiner's rejection and requests reconsideration in view of the following remarks.

As is apparent from the above-proposed amendments, the phosphoric acid ester and thiophosphoric acid ester have been restricted in the present invention to at least one trialkylphenyl phosphate, triphenyl thiophosphate, or tricresyl thiophosphate, all of which have no free hydroxyl group.

The phosphoric acid esters described in Okada et al have one or two free hydroxyl groups (see col. 3, lines 33-53) and there is no teaching in Okada et al of phosphoric acid esters having no free hydroxyl group. It is submitted that the use of the phosphoric acid esters of Okada et al having one or two free hydroxyl group such as oleyl phosphate employed in the examples of Okada et al (see col. 6, lines 6-10) does not provide a lubricating oil composition having satisfactory thermal stability.

Since there is nothing in Okada et al that teaches or suggests that the use of the phosphoric acid esters having no free hydroxyl group when employed in a lubricating oil composition provides satisfactory thermal stability, withdrawal of the rejection under 35 U.S.C. 103(a) based on this reference is respectfully requested.

Claims 1-36 are also rejected under 35 U.S.C. 103(a) as being unpatentable over Miyagawa et al (5,536,423) or Miyagawa et al (5,561,104).

The Examiner states that:

"The Miyagawa et al ["Miyagawa"] references disclose a hydraulic working oil composition for buffers which comprises a base lubricating oil and (A) at least one phosphorus-containing compound selected from the group consisting of (a) a phosphoric acid ester, (b) a phosphorous acid ester, and (c) a salt of the phosphoric acid ester (a) and/or the phosphorous acid ester (b) an aliphatic monoamine having 8-22 carbon atoms; and (B) at least one nitrogen containing compound selected

from an aliphatic polyamine and a salt thereof with an aliphatic acid. See column 2, lines 5-50 in '423 and column 2, line 13 to column 3, top in '104. The base lubricating oil includes both mineral oil and synthetic oil and preferably has a viscosity in the range of 8-60 cSt at 40°C. Both references teach the addition of other additives to the composition including ashless dispersants such as succinic imide, succinic esters and benzylamine. See column 13, lines 9-32, and claim 20 of '423 and see column 6, lines 4-5 of '104. The examiner is of the position that the Miyagawa references also clearly meet the limitations of the above rejected claims when component (A) is (c) a salt of phosphoric acid ester (a) and a salt of phosphorous acid ester (b) and an aliphatic monoamine having 8-22 carbon atoms. Applicants' open-ended claim language "comprising" allows for the addition of other additives to the composition such as component (B), at least one nitrogen-containing compound."

Applicants respectfully must traverse the Examiner's rejection and requests reconsideration in view of the following remarks.

As is apparent from the above-proposed amendments, the phosphoric acid ester and thiophosphoric acid ester have been restricted in the present invention to at least one trialkylphenyl phosphate, triphenyl thiophosphate, or tricresyl thiophosphate, all of which have no free hydroxyl group.

The preferred phosphoric acid esters and phosphorous acid esters disclosed in the Miyagawa references contain at least one hydroxyl group. See, for example, column 5, lines 51-64 in '423 and column 4, lines 26-52 in '104.

Since there is nothing in the Miyagawa et al references that teaches or suggests that the use of the phosphoric acid esters having no free hydroxyl group when employed in a lubricating oil composition provides satisfactory thermal stability, withdrawal of the rejection under 35 U.S.C. 103(a) based on these references is respectfully requested.

CONCLUSION

Since there is nothing in the disclosure of Okada et al (U.S. Patent No. 4,634,543), Miyagawa et al (U.S. Patent No. 5,536,423) or Miyagawa et al (U.S. Patent No. 4,561,104), which teaches or suggests the presently claimed invention, withdrawal of the

rejection of Claims 1-36 under U.S.C. 103(a) in view of these references is respectfully requested.

It is believed that in view of the foregoing amendment and arguments, the Examiner will appreciate that the Applicants have made an unexpected discovery and a distinct advance in the art which is not disclosed or suggested by the art of record.

It is therefore respectfully solicited that the Examiner withdraw the rejection and that the claims be allowed in view of this response.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Steven G. K. Lee", is written over a horizontal line.

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Enclosure: Petition for Extension of Time
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